

PHYTOPHTHORA CROWN ROT OF PETUNIA AND SNAPDRAGON

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Florida's mild climate permits the use of many types of flowering annual bedding plants year round. A good assortment of colorful plants is usually available in six packs or flats at the appropriate season from local nurseries. A wider selection of annuals awaits the gardener willing to invest some time seeding or transplanting seedlings for the appropriate season. Petunias (*Petunia hybrida* Vilm.) and snapdragons (*Antirrhinum majus* L.) are among the most popular and colorful of the annuals planted during the cool months (October-November through February-March) in Florida. Both are prolific bloomers and of relatively easy culture, but crown rot caused by species of *Phytophthora* can cause significant losses, especially in the seedbed or when plants are transplanted to their permanent locations.

SYMPTOMS. Classical pre- and post-emergence damping-off symptoms can be caused by *Phytophthora* in the seedbed. On established seedlings and older plants, the foliage may appear meager and chlorotic, with wilting occurring even when soil moisture is adequate. The central whorl of young petunias can display necrosis from the base of leaves outward (Fig. 1A). When uprooted, symptomatic plants may possess a surprisingly healthy appearing and well-developed root system, but stem and root tissues at the ground line will be discolored (brown to dark brown) and mushy (Fig. 1B). Root rot sometimes accompanies crown rot.



Fig. 1. *Phytophthora* crown rot of petunia. A) Petunia transplant infected with *Phytophthora parasitica*. Leaves are stunted, flaccid, chlorotic, and crown is necrotic. B) Healthy plant is on left. Note discolored crown and lower stem tissues on diseased plant on right. (DPI Photo #702896 and 702896-21)

DISEASE DEVELOPMENT AND SPREAD. Species of *Phytophthora* responsible for crown rot of petunias and snapdragons are considered soil-borne, occasionally being splashed or carried to above ground sites. *Phytophthora parasitica* Dastur (= *Phytophthora nicotiana* var. *parasitica* (Dastur) Waterhouse) is the causal agent of petunia crown rot; *Phytophthora parasitica* or *P. cactorum* (Lebert & Cohn) Schroeter can cause crown rot on snapdragons. Both species have wide host ranges (4), though host specialization is known to exist in both species (7,8).

Zoospores released from zoosporangia are the primary infective propagules. These propagules propel themselves for short distances in the soil water matrix, and are chemically and/or electrostatically attracted to host tissues (1,4). Germ tubes can arise from zoosporangia under certain conditions, and

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infection by direct germination of zoosporangia is a possibility (5,6). Infection generally takes place at the soil line during periods of cool, wet weather. Splashed inoculum can initiate foliar blight on petunia. Most losses can be expected in the first six to eight weeks on direct seeded beds, but well established older plants can be killed. The period just after transplanting is also a particularly vulnerable time.

Phytophthora cactorum persists in soil primarily as oospores both free in soil and/ or embedded in infected plant debris (6). Oospores germinate by formation of a germ tube or a sporangium (2,5). Both *P. parasitica* and *P. cactorum* also produce chlamydospores which apparently function much like oospores (5). Zoosporangia are capable of surviving for several weeks in the absence of a suitable host (3). These pathogens are not considered good saprophytes, but carry over of irregularly germinating oospores and chlamydospores very efficiently provide a means of long term survival in soil, as does the very wide host range.

On petunia and snapdragon specimens submitted to the Bureau of Plant Pathology, Phytophthora crown rot often occurs in conjunction with Rhizoctonia solani, and species of Pythium and Fusarium. Phytophthora predominates in the diagnosis of crown rots on these two hosts, but similar symptoms could be caused by these other fungi, either alone or in combination.

CONTROL. Seedlings should be started in a clean, pathogen-free potting medium with good drainage. If seeds are to be planted directly into flower beds, soil should be amended if necessary to provide good drainage. If a bed has a history of Phytophthora crown rot, soil fumigation with Vapam or methyl bromide, preplant drenches with fungicides, and/or crop rotation with resistant plants is recommended. Among the alternatives for Florida winter bedding plants with Phytophthora resistance are: alyssum, bachelor's button, calendula, calliopsis, candytuft, delphinium, linaria, linum, nierembergia, pansy, phlox, poppy, statice, stock, sweetpea, verbena, and viola. Summer bedding plants which should be avoided in the rotation in infested beds because of Phytophthora susceptibility are daylily, geranium, gerbera, impatiens, kalanchoe, periwinkle, and salvia.

To minimize Phytophthora problems on petunia and snapdragon transplants, time planting so that transplants are well developed and growing vigorously, and use care when transplanting to avoid plant injury. Fungicide treatment of transplants before and/or after planting can be helpful. Deep planting should be avoided.

*Fungicides with EPA registration for use on petunia and snapdragon which would be effective against Phytophthora crown rots are Terrazole, Truban, Banrot, captan, and Lesan. Subdue is an additional systemic fungicide labelled for use on snapdragon for Phytophthora crown rot control, but as of this writing, no label exists for use on petunia. All fungicides mentioned are used as soil and crown drenches for Phytophthora control. Label directions should be followed carefully to make certain application rates and times (intervals) are accurate and maximum effectiveness is obtained.

SURVEY AND DETECTION. In the seedbed, Phytophthora can cause typical pre- and post-emergence damping-off symptoms. On older plants, look for wilted, stunted, and chlorotic foliage accompanied by rotted, dark-colored tissues at the crown/ground line.

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*NOTE: Recommendations for pesticide usage contained in this publication are compiled from current information and to the best of our knowledge are in compliance with company labels and the "Florida Plant Disease Control Guide." Chemical company labels and control guide recommendations are subject to change and should be considered before pesticide application. The use of pesticide trade names is with the understanding that no discrimination is intended and no endorsement by the Florida Department of Agriculture and Consumer Services is implied.